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(58) Field of Search

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(54) Remote meter reading by power line/radio and telephone

(57) A system transfers data to and from a control and/or metering means for gas, water or electricity in or adjacent a premises, relating to a utility or combination of utility supplies to said premises, to and from a remote data monitoring station such as that operated by the utility provider to allow remote meter readings. In one embodiment the transfer of data is achieved via a power line carrier or radio signal from the control and/or metering means to a communication means in the premises and then via a telecommunications line to the remote data monitoring station thereby providing a suitable system which can utilise existing facilities to transfer data.

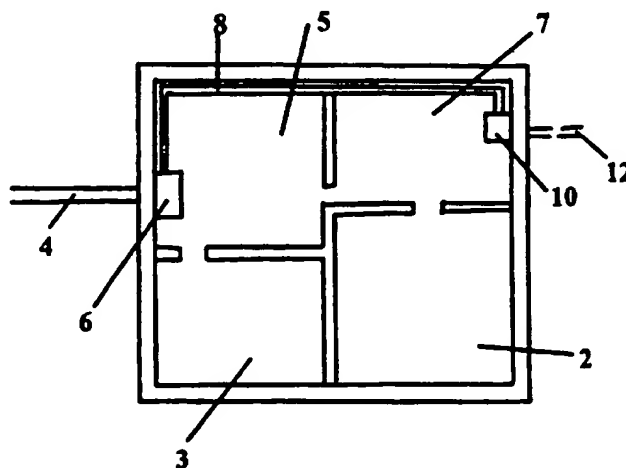


FIGURE 1

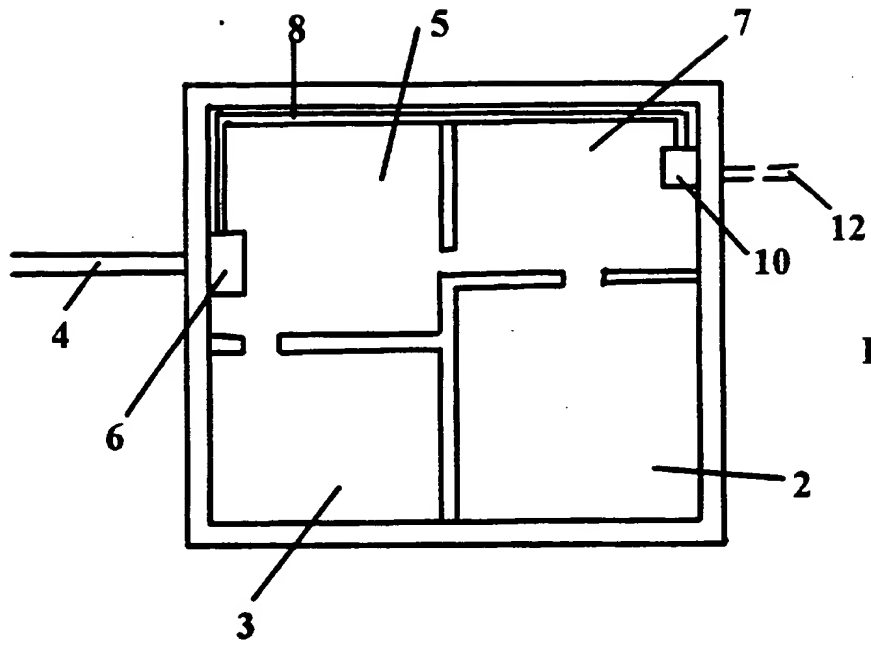


FIGURE 1

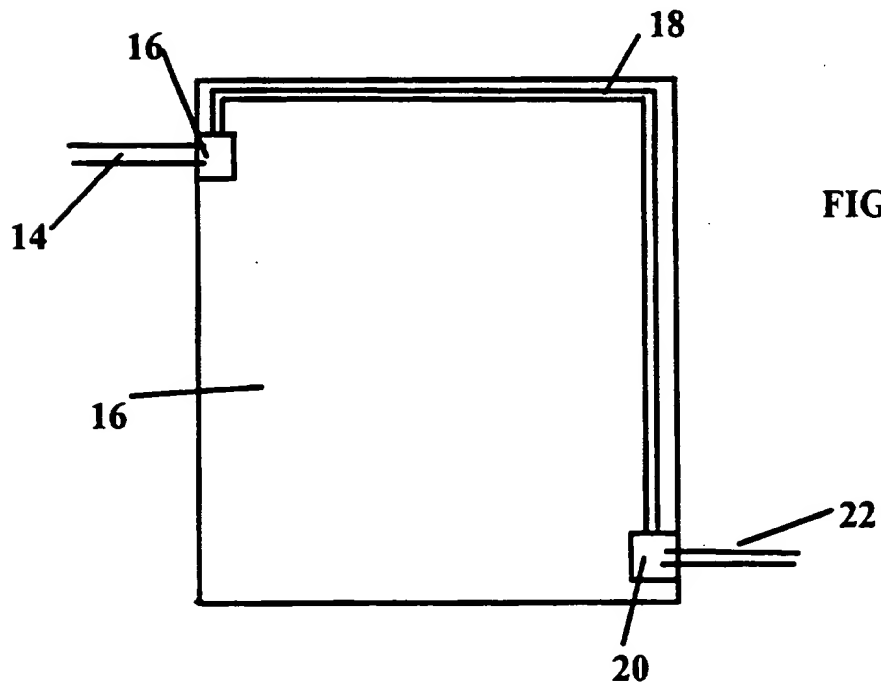


FIGURE 2

**2310779**

## Utility Metering and Control Data Carrying System

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The invention which is the subject of this application is a system which provides a more efficient and more economical apparatus and method for carrying data from a control and/or metering unit for a utility supply to a building and carrying the data within the building and allowing the transfer of the same from the building for remote meter reading at a remote data monitoring station and also to allow signals indicating the performance of the meter, operating parameters for the meter and failure of supply data to be sent and received by the system.

The ability to transfer data from a control and/or metering unit such as a meter of a utility such as gas, electricity and water is possible using communication lines which are provided within domestic premises and/or industrial premises. However, in order to transfer the data for remote reading, it is necessary to provide additional units such as data processing systems which allow the data carried by the communication line to be transferred and processed into the correct manner for transmission by a telecommunications line from the premises to the remote data monitoring station.

Furthermore, and in particular in industrial premises, where what are known as Code 5 meters and three phase power supply lines are used, it is required to have a separate telephone line installed into the premises to lead from the meter to the point of telephone line entry into the building. As typically the position of the meter is not close to the point of entry of the telephone lines into the

building, it has been found that considerable lengths of telephone line are required to be installed and this can add considerable expense to this type of system and, indeed, may lead to the system of carrying the meter data for reading at a remote point to not being installed or utilized.

Thus, at the present time, while there are clear advantages in providing apparatus to allow meter data to be transferred to a remote meter data monitoring and/or transmitting station, the practical difficulties in installing additional communications wiring and the like in premises prevents full utilization of this system. The practical difficulties include the cost of the additional telecommunications line and the cost and inconvenience of installing the same into the premises.

The aim of the present invention is to provide a system whereby data from and to control and/or metering units for utilities can be carried by power lines or radio signals in buildings and then transferred via a communication means to suitable telephone line carriers for transmission to a remote data monitoring and/or transmitting station and said system allowing the meter to be connected to the phone network for the transmission of data with a minimum of inconvenience to the premises or the premises occupiers.

In a first aspect of the invention there is provided a data carrying system, said system comprising a utility supply, a control and/or metering means connected to the utility supply to provide or receive data related to the supply, wherein said control and/or metering means are connected to a power line for carrying the data therealong and wherein there is also connected to the power

line a communication means, said means connected to an outgoing telecommunication line and said communication means provided to allow data to be transferred, sent or received.

Typically the utility supply is to a premises, domestic or industrial and the control and/or metering unit includes a meter to measure consumption of the utility and the communication means is a telephone connected to an outgoing telecommunication line and to the power line in the premises and said telephone provided with means to allow the data to be transferred and sent or received.

Typically the data is any of data sent from the meter such as readings of consumption, indications of failure in supply or low supply, malfunctioning of apparatus or the like to a remote monitoring station and/or transmitted data in the form of costing information, control parameters and the like.

In one embodiment, the data can be sent by the occupier of the premises simply by dialing the number of the remote data monitoring station and then transferring the data received from the power line or, alternatively, the remote data monitoring station may automatically contact the number of the telephone of that premises and access and/or send to the control and/or metering unit the data via the power line automatically and without disturbing the occupier of the premises.

It is envisaged that one particularly suitable telephone is the type which is increasingly used which includes a visual display screen and said screen is

powered by connection to the power supply of the premises thereby allowing the connection to the power supply line which is not normally the case with conventional telephones which are normally powered through the telephone line only. However it should be understood that existing telephones can be retrofitted with suitable units connected to the power supply line to allow the same to be used or any other type of telephone which has a connection to the power supply line can be used for the purposes of this invention.

Typically the power line connection is what is known as a C-band power line carrier which is typically provided within domestic premises. This type of power carrier is capable of carrying data in addition to electricity supply and thus, the data from and to control and/or metering means can be carried along the power line when required for the data to be sent to or received from a remote monitoring station. Typically the power supply into domestic premises is single phase and hence the C-band power line is typically provided in these domestic premises as standard and thus no additional or inconvenient installation for additional communication lines and the expense which this involves is required.

As a further feature of the invention, if the type of telephone used has a visual display screen, the data can also be displayed on the screen to allow visual access to be gained to the data by the occupier of the premises. Thus the need to provide display means on the meter itself is removed and in one example the costs of consumption can be calculated and displayed by the reception of costing information from the utility supplier.

In an alternative aspect, the use of a power line to carry data between the

meter and telephone is substituted by the provision of low power radio signal transmitting and receiving apparatus on the meter and telephone thereby allowing the passage of data between the two by radio signal. Typically the radio signal apparatus is of the low power type.

In whichever embodiment, the communication means which can be in the form of the telephone apparatus acts as an interface for connection between the carrier of the data, whether power line or radio signal, and the telecommunications system by which the data is transferred to and from the premises to the remote data monitoring station.

In a further aspect of the invention there is provided a system for transferring data to and from a utility control and/or metering means from a remote data monitoring station for use in conjunction with a three phase power supply to a premises, said system comprising a three phase power supply into the premises, the control and/or metering means connected to the three phase power supply and a telecommunications line for the transfer of data from the metering means and a remote monitoring station and wherein the system further includes a power line carrier connecting the metering means to a modem which in turn is connected to the telecommunications line to allow transfer of data from the metering means to the modem and hence onwards to the remote monitoring station.

Typically the metering means in this arrangement is what is known as a Code 5 meter and the premises are industrial premises which are provided with three phase power supply due to the increased power requirement in comparison

with domestic premises. The provision of the power line carrier in the industrial premises typically requires the installation of an additional C-band power line to carry the data to the modem but this is significantly cheaper than providing a dedicated additional telephone line to connect the meter through the premises to the telephone line outlet as is currently required.

In a further aspect of the invention there is provided a method for the control and/or monitoring of a control and/or metering means for a utility supply, remotely from the premises for which the control and/or metering means is installed, said method comprising the steps of initiating the transfer of data to or from the control and/or metering means, transferring the data between the control and/or metering means and a telecommunications means via a power line carrier or radio signal in the premises, to transfer said data to a telecommunications line and transferring the data via the telecommunications line to or from a remote data monitoring station.

In one embodiment the initiation is commenced by the remote meter data monitoring station dialling the number of the telecommunications interface on the premises. Typically the telecommunications interface can be either of a telephone or a modem.

In a further embodiment the system of the invention can be utilised in conjunction with a prepayment method whereby the blocks of the utility are pre-purchased and the communications means and/or control and/or metering means can be provided to receive information of the cost of the utility at that instant from the utility supplier via the system and calculate and display the



amount of the prepaid block remaining and/or consumed.

Specific embodiments of the invention will now be described with reference to the accompanying drawings wherein:-

Figure 1 illustrates a schematic plan view of a domestic premises with the data carrying system installed according to one embodiment; and

Figure 2 illustrates a schematic plan view of an industrial premises with the data carrying system installed according to a second embodiment.

Referring firstly to Figure 1 there is illustrated a domestic premises comprising a number of rooms 2; 3, 5, 7, the domestic premises provided with a power supply 4 which is typically single phase and which in this case is the utility to be metered and/or controlled but any other or any combinations of utility supplies can equally be metered and/or controlled using this system. In this case the utility in the form of the said power supply is connected to a control and metering means 6 installed in or adjacent to the premises. The premises is provided with a C-band electrical power line carrier network as standard to which are connected standard electrical sockets provided in various parts of the premises. The power line carrier 8 which is part of this network and as connected to the meter allows the transmission of data from and to the meter representing indications of faults, consumption readings and the like relating to the utility. Also provided is a communication means in the form of a telephone system 10 which is connected to a telecommunications line 12 which allows telecommunication connection from the premises to remote points. The

telephone 10 is provided with a power connection to the power network of the premises and hence is connected to the power line carrier 8. One known type of telephone which would be suitable for this is the type which includes a visual display screen and is plugged into the power supply to allow additional power for the visual display screen to operate. Thus the telephone 10 acts as an interface to allow data to be carried to and from the control and metering means 6 via the power line 8 and for the same to be transferred to the telecommunications line 12 via the telephone 10 and thereby allow a remote monitoring station (not shown) to be connected via the telecommunications line 12 to receive and send data to and from the meter 6.

Figure 2 illustrates an alternative arrangement of the invention wherein there is provided a three phase power supply 14 to an industrial premises 16 as the power supply required for the industrial premises is substantially larger than for a domestic premises. This power supply which is the utility to be monitored and to which the data is to relate is connected to a control and/or metering apparatus 16 and, conventionally, this meter is what is known as a Code 5 meter. Conventionally, if the data from this meter is to be transferred and remotely read, a dedicated telephone line is required to be installed in the premises. In an industrial premises which can be extremely large, the metering apparatus is typically at a position removed from the in-coming telecommunications line, and the additional wiring which is required to connect the meter to the outgoing telecommunications line can be substantial and hence the required cost for this installation is prohibitive. In the embodiment shown in Figure 2, the telephone communications line is replaced by a C-band power carrier line 18 which can be connected with the necessary components to

provide a power supply system through the industrial premises and also to allow the meter data to be carried from the meter to a modem 20, which in this case is located adjacent to the outgoing telecommunications line 22. Thus, the modem acts as a telecommunications interface to allow the data carried on the power line carrier 18 to be transferred to the telecommunications line 22 and hence again allow access to be gained from a remote meter data monitoring station to the data from the meter 16.

In an alternative embodiment the power line carriers are not used and, instead low power radio signal apparatus is provided on the meter and telephone or modem to allow signals to be transferred between the two.

Thus, the remote monitoring data station can call up either the telephone or modem according to the present invention and demand or send data relating to the utility control and/or metering means 6 or 16 or can be connected by the transmission of data from the control and/or metering means upon, for example a fault in supply occurring. Upon initiation, the data is transferred to the telecommunications interface in the form of either telephone 10 or modem 20 via the power line carriers 8 or 18 whereupon the data is transferred to the telecommunications line 12 or 22 and transferred to the remote monitoring station.

Thus, in the case of the domestic premises, power line carriers which are already installed as a standard supply network can be used to transfer the data from and to the control and/or metering means and telephone interface and thus the expense of installing and utilizing this system is significantly reduced as

no additional wiring and the like is required to be included. In the case of the industrial premises, the provision of a power line carrier as opposed to a dedicated telephone line installation within the premises again significantly reduces the expense of installation of this system. Thus the cost and inconvenience of providing the meter and telephone in connection is minimised in comparison with known systems and the ability to transmit data to the utility provider at a remote point means that faults or failure in supply of the utility can be more quickly and accurately located and dealt with thereby improving the service to utility customers. The savings in cost and inconvenience of this system therefore makes the idea of sending data a viable proposal to utility providers.

Thus the invention which is the subject of the application relates to a system for the transfer of data to and from a control and/or metering means in or adjacent a premises, relating to a utility or combination of utility supplies to said premises, to and from a remote data monitoring station such as that operated by the utility provider to allow remote meter readings. In one embodiment the transfer of data is achieved via a power line carrier or radio signal from the control and/or metering means to a communication means in the premises and then via a telecommunications line to the remote data monitoring station thereby providing a suitable system which can utilise existing facilities to transfer data.

## Claims

1. A data carrying system, said system comprising a utility supply, a control and/or metering means connected to the utility supply to provide or receive data related to the supply, said control and/or metering means connected to a power line for carrying the data therealong and wherein there is also connected to the power line a communication means, said means connected to an outgoing telecommunication line and said communication means provided to allow data to be transferred, sent or received.
2. A data carrying system according to claim 1 wherein the data comprises data which can represent any, or any combination of; readings of consumption; indications of failure in supply or low supply; malfunctioning of apparatus or the like to a remote monitoring station and/or the transmission to the meter of data in the form of costing information; control parameters.
3. A data carrying system according to claim 1 wherein the utility supply is to a premises and the control and/or metering means is provided in or adjacent to said premises and the data is received or transmitted from and to a remote monitoring station.
4. A data carrying system according to claim 3 wherein the data is transmitted by the occupier of the premises by dialling the number of a remote data monitoring station and then transferring the data to or from the control and/or metering means

5. A data carrying system according to claim 3 wherein the data monitoring station automatically contacts the communication means of the premises and transfers and/or transmits the data from and to the control and/or metering means via the power line automatically and without disturbing the occupier of the premises.

6 A data carrying system according to any of the preceding claims wherein the communication means is telecommunication apparatus.

7. A data carrying system according to claim 6 wherein the telecommunications apparatus includes a visual display screen powered by connection to the power supply line.

8 A data carrying system according to claim 7 wherein the data is displayed on the screen to allow visual access to be gained to the data by the occupier of the premises and can also selectively be used to calculate consumption costs upon the transmission of data thereto be the utility provider.

9. A data carrying system according to claim 6 wherein the telecommunication apparatus is provided or retrofitted with means to allow the same to be connected to the power supply line.

10. A data carrying system according to any preceding claim wherein the power line connection is a C-band power line carrier which is capable of carrying data in addition to electricity supply.

11. A data carrying system according to claim 1 wherein the control and/or metering means is connected for the transmission and reception of data to the communication means by radio signal transmitting and receiving apparatus instead of by power line carrier.

12. A data carrying system according to any preceding claim wherein the communication means acts as an interface for connection between the carrier of the data, whether power line or radio signal, and the telecommunications system by which the data is transferred to and from the premises to the remote monitoring station.

13 A system for transferring data to and from a utility control and/or metering means to a remote data monitoring station, said system comprising a three phase power supply into the premises, control and/or metering means connected to the three phase power supply, and a telecommunications line for the transfer of data to and from the remote monitoring station and wherein the system further includes a power line carrier connecting the control and/or metering means to a modem which in turn is connected to the telecommunications line to allow transfer of data to and from the control and/or metering means to the modem and hence to the remote monitoring station.

14 A system for transferring data according to claim 13 wherein the control and/or metering means in this arrangement is a Code 5 meter.

15 A system according to claim 13 wherein the power line carrier in the

industrial premises requires the installation of a C-band power line to carry the data to the modem.

16 A method for the control and/or monitoring of a control and/or metering means for a utility supply, remotely from the premises for which the control and/or metering means is installed, said method comprising the steps of initiating the transfer of data to or from the control and/or metering means, transferring the data between the control and/or metering means and a telecommunications means via a power line carrier or radio signal, to transfer said data to a telecommunications line and transferring the data via the telecommunications line to or from a remote data monitoring station.

17 A method according to claim 16 wherein the initiation is commenced by the remote data monitoring station dialling the number of the telecommunications means of the premises.

18 A method according to claim 17 wherein the telecommunications means is either of a telephone or a modem.

19. A method according to any of claims 16-18 wherein the system is used with a prepayment method whereby blocks or units of the utility supply are prepurchased and the telecommunication means and/or control and/or metering means can be provided to receive information of the cost of the utility at that instant from the utility supplier and calculate and display the amount of the prepaid block remaining and/or consumed.



20 A system as hereinbefore described with reference to the accompanying drawings.

21. A method as hereinbefore described with reference to the accompanying drawings.



Application No: GB 9704101.6  
Claims searched: 1-21

Examiner: Mr B J Spear  
Date of search: 20 May 1997

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): H4K (KOC) ; H4R (RTSC, RTSR, RTT, RTR, RTC)

Int Cl (Ed.6): H04M 11/00; H04Q 9/00

Other: Online: WPI

**Documents considered to be relevant:**

Category	Identity of document and relevant passage		Relevant to claims
XE	GB2306852A	(Eastern Group). Whole document, eg, Fig. 1 and pages 11-15)	1-3, 6, 9, 12, 13, 16, 18 at least
XP	GB2297663A	(GEC). Whole document, eg Fig. 1 and pages 3-6	11, 12, 16-18 at least
X	GB1400477	(Northern Illinois) Whole document, eg Figs. 1 and 4 and p 2 l 113 to p 7 l 87	1-3, 6, 9, 12, 13, 16 at least
X	EP0629098A2	(Logica) Whole document, eg Fig. 2 and p 3 l 35 to p 6 l 29.	11, 12, 16-18 at least
X	EP0463893A2	(Schlumberger) Whole document, eg p 6 l 16 to p 9 l 49	1-3, 6, 9, 12, 13, 16 at least
X	WO93/02532A1	(Chang) Whole document, eg Fig. 1.	1-3, 5, 6, 9, 12, 16-18 at least
X	WO89/06079A1	(Gordon) Whole document, eg Fig. 1 and p 6 l 35 to p 12 l 20	11, 12, 16-18 at least

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.

& Member of the same patent family

A Document indicating technological background and/or state of the art.  
P Document published on or after the declared priority date but before the filing date of this invention.  
E Patent document published on or after, but with priority date earlier than, the filing date of this application.



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Application No: GB 9704101.6  
Claims searched: 1-21

Examiner: Mr B J Spear  
Date of search: 20 May 1997

Category	Identity of document and relevant passage	Relevant to claims
X	US4455453 (Metretek) Whole document, eg Fig. 1 and cols 1-6.	1-9,16-19 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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